(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 111 721 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.06.2001 Bulletin 2001/26

(51) Int Cl.[7]: **H01R 12/16**, G06K 7/00

(21) Application number: **00403611.7**

(22) Date of filing: **20.12.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **22.12.1999 FR 9916218**

(71) Applicant: **F.C.I. - Framatome Connectors International**
92084 Paris La Défense Cedex (FR)

(72) Inventors:
- **Camacho, Gabriel**
  25300 Pontarlier (FR)
- **Cabane, Francis**
  39100 Dole (FR)
- **Cailler, Olivier**
  25300 Pontarlier (FR)

(74) Representative: **Schmit, Christian Norbert Marie**
Cabinet Christian Schmit et Associes,
8, place du Ponceau
95000 Cergy (FR)

(54) Microcircuit card connector and process for installing the card in such connector

(57) A connector (1) for receiving a microcircuit card, the connector having a resilient arm (9) on a first border (10) of the seat (2) of the connector. The arm is curved inwardly towards the seat to exert pressure on an edge of the card in the direction of a second border (11) of the seat, opposite the first border. It allows to limit a longitudinal mobility of the card in its seat. Further, the connector also has releases (14, 15, 19, 31, 36) on an upper portion of its housing to cover an upper portion of the card, in order to prevent a vertical mobility of the seated card.

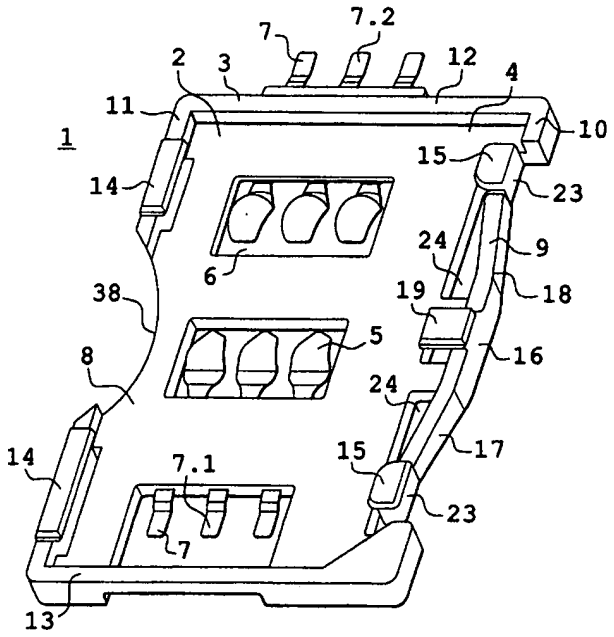

Fig. 1

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Description

[0001] The present invention relates to a microcircuit card connector. It also relates to a process for installing; the card in such a connector. More particularly, it finds use in the field of chip card connectors, especially in the field of electronic minicard connectors. These connectors are generally designed to be installed in electronic apparatuses of small size and volume, typically in «pocket» apparatuses, such as portable radiotelephones. In prior art, connectors are known for receiving such microcircuit cards, such that a connector has both means for retaining the card in a connector space, and means for holding the card against the contacts of this connector. The interest of the invention lies in that it provides a connector having a simple means to retain the card in the connector in a position in which it is connected with the connector contacts.

[0002] In prior art, a connector is particularly known from the principle of document US-A-5,320,552, which has a housing that forms a seat for a microcircuit card and has contacts at the bottom of this seat to come in contact with conductive segments of the microcircuit, The seat of this connector has a shape which is complementary to a volume defined by the card to be inserted in this connector. Hence, the distances between the borders of the seat are adjusted to correspond to the card size. In order to assure the quality of contact between the conductive segments of the microcircuit and the connector contacts, this connector has a cover. According to this document, the cover may be pivoted between an open and a closed position. In the closed position, a lower face of the cover abuts against the microcircuit card in such a manner as to press the conductive segments of the latter against the contacts of the connector. As a result, the cover prevents any vertical mobility of the card in its seat.

[0003] The microcircuit card is held in this connector by a first border set and by a second border set, the second border set being orthogonal to the first border set. These borders allow to delimit the seat. They prevent any longitudinal and lateral mobility of the card in the seat of the connector. Nevertheless, to this end, the seat size must be perfectly adjusted to fit the size of a card to be inserted, which is not easily obtained.

[0004] Such prior art connector involves a problem. Its structure is complex due to the use of a pivoting cover and, in addition, the connector is bulky due to the added thickness of the cover.

[0005] An additional shortcoming of such a type of connector is related to the fragility of its structure. In fact, in such a connector, the cover is attached to the housing by means of a mechanical joint. Since this mechanical joint is miniature-sized, it is fragile.

[0006] Also, a prior art microcircuit card connector is known from the principle of document EP-A-0 515 897. This connector also has a housing with a card seat. The seat is provided in such a manner that contacts are provided over a bottom of the seat to contact the conductive segments of the microcircuit. In order to retain the card in its seat, the housing has on a first side a groove to receive a first edge of the card and, on a second side, opposite to the first side, a tip. The tip is rotationally flexible. When a first edge of the card is locked in the groove, and the card is pushed down into the seat, a second edge of the card abuts against this chamfered tip. Then the flexible tip is slightly pushed inwardly towards the seat, which is partially undercut in that area, to allow the passage of the card and properly position it in its seat.

[0007] Further, the card is held vertically in its seat by releases of the groove and by the presence of the tip cooperating with a resilient lever which is provided on the lower face of the housing. Conversely, the longitudinal and. lateral mobility of the card inside the seat is only assured by the fixed borders of the seat. As a result, in order to prevent any movement of the card inside its seat, the size of said seat must be strictly complementary, any clearance being accounted for, to the card shape.

[0008] Such type of prior art connector also has a problem. The card-receiving structure of the housing is fragile. The housing uses two flexible means, the tip on the one hand and the resilient lever on the other. Now, in order to properly insert a card in this connector, a strong pressure force must be exerted on the flexible tip. Also, in order to remove a microcircuit card inserted in such connector, the lock generated by the flexible tip must be released. To this end, a rotary force must be exerted on the axle about which said tip rotates. This axle is fragile, because it is attached to the edges of the housing by thin structures. In fact, these structures are specially designed to be thin to allow these rotary movements. Hence, there is the risk of rupturing these thin structures , thereby making the connector useless.

[0009] Also, an intrinsic variability of chip card sizes exists and is associated to production processes. Hence, a wider seat must be provided to accept the maximum number of cards. However, in this case the card is positioned in an insecure manner in its seat, and may even float therein.

[0010] The present invention has the object to solve both size and fragility problems of prior art connectors and variability problems, by providing a connector having a flexible member which causes a translation of the card in a seat of a housing of the connector, to retain said card in a fixed position in the seat. Therefore, the invention provides a housing such that on one side of the seat, a fixed border of the housing has overhanging releases to cover a first portion of a top surface of the card to be inserted in the seat. Also, on a second side, preferably opposite said first side, the housing has a flexible arm, situated within the dimensions of a frame formed by the housing. This arm is only fastened at one point of the border. The flexible arm has a free end which snaps inwardly towards the seat by elastic translation, parallel to the card plane, in such a manner as to force

a card seated therein against the first border.

[0011] On the other hand, this flexible arm also has an upper release to additionally cover a portion of the upper face of the card. Such a connector generally has contacts ever its bottom to provide contact with the conductive segments situated on the microcircuit card. In f act, such type of connector la specially conceived to receive microcircuit minicards.

[0012] In order to insert a microcircuit card in a connector according to the invention, a first edge of the card must be placed beneath the releases of the flexible arm. Then, pressure is applied on the card, which is disposed obliquely with respect to the seat bottom, to displace the card parallel to said bottom, an to deform the free end of the flexible am. The flexible arm moves back until the first edge comes in contact with the borders situated level with the arm. Then, a second edge of the card, said second edge being opposite the first edge, is pushed down. When said second edge is pushed down into the seat, the card abuts against the contacts contained at the bottom of the seat. Once the card is parallel to the seat bottom the pressure against the resilient arm is released, to let the card abut, under the effect of the pressure exerted by the resilient am, against the first border of the housing. Then, the releases provided on this first border of the housing overhang a portion of the card.

[0013] Therefore, the card is held vertically by a cooperation between the seat bottom and the releases provided on each of the borders. Also, this card is held longitudinally by means of the resilient am which forces the card against the second border of the housing. According to the invention, a lateral mobility of the card inside the housing has no adverse effect until such a connector may be provided whose size is finely adjusted according to the lateral orientation of the card. Alternatively, such a connector may be provided that the contacts provided over the seat bottom may abut against the most important segments of a microcircuit situated on a card to be inserted in this seat.

[0014] Therefore, the invention relates to a microcircuit card connector having a housing with a card seat and contact blades intended to come in contact with the conductive segments of the microcircuit, said blades being provided over a bottom of the housing against which the card is placed, characterized in that the housing includes a first border having an arm which is aligned with said border and is flexible to hold the card against a second border of the housing, said second border being opposite the first border, the flexible arm having at least one free end which elastically snaps towards the second border when the card is seated, to let the latter come to abutment in a predetermined position.

[0015] The invention also relates to a process for installing a microcircuit card in a connector, characterized in that it includes the following steps

- placing a first edge of the card against a first flexible border of a connector housing, se that the card forms an acute angle with a plane of a housing bottom;
- pushing down a second edge of the card, said second edge being opposite the first edge, by deforming the flexible border thanks to a pressure exerted on the first edge;
- placing the card parallel to the bottom;
- releasing the pressure exerted on the flexible border to place a portion of an upper face of the card beneath a release of a second border.

[0016] The invention will be understood more clearly by reading the following description with reference to the accompanying figures. The latter are only shown by way of example and do not intend to limit the invention in any manner. The figures show:

- Figure 1: a top perspective view of a first embodiment of a connector according to the invention;
- Figure 2: a sectional view of the first embodiment of the connector according to the invention;
- Figure 3: a. top perspective view of a second embodiment of a connector according to the invention;
- Figure 4: a top perspective view of a variant of the connector according to the invention;
- Figure 5: a top perspective view of a third embodiment of a connector according to the invention;
- Figure 6: a sectional view of the third embodiment of the connector according to the invention,

[0017] Figure 1 shows a connector 1 according to the invention. The connector 1 is designed to receive a microcircuit card (not shown) in a seat 2 of a housing 3. The housing 3 particularly includes a bottom 4 whereat contacts 5 are provided, which are to come in contact with conductive segments of a microcircuit situated on a card which can be inserted in the seat 2.

[0018] In a preferred embodiment of the invention, the contacts 5 are metal resilient blades which may be, for instance, molded inside the housing 3. In this embodiment, as shown in Figure 1, the housing 3 includes a bottom 4 having an aperture 6 wherefrom the active conductive portions of these contact blades 5 appear. In this embodiment, the contact blades 5 are preferably provided level with the bottom 4. Also, the contact blades 5 have contact tabs 7 to be welded, for instance, on a printed beard. These contact tabs 7 may be provided in the space delimited by the frame of the housing 3, as in the case of contact blades 7.1 which are provided in an aperture like the aperture 6. However, they may be also provided at a peripheral side of the frame of the housing 3, as in the case of the contact tabs 7.2.

[0019] The connector 1 has a resilient arm 9, such that said resilient arm 9 is included in a frame delimited by the borders of the housing 3. In fact, the housing 3 particularly has a first border 10 such that said first border 10 defines a plane which does not extend beyond the resilient arm 9. In one embodiment, as shown in Figure

1, the resilient arm 9 is inwardly curved towards the seat 2. Therefore, the resilient arm 9 may be pushed from this position in which it 18 inwardly curved towards the seat 2, to a second position in which it is partly aligned with the border 10.

[0020] The housing 3 has a second border 11, such that this second border 11 is opposite the first border 10. The second border 11 is fixed. It is also rigid. The housing 3 further includes a third border 12 and a fourth border 13. The borders 12 and 13 are preferably perpendicular to the borders 10 and 11, which are parallel to each other. The frame defined by the housing 3 has a generally rectangular shape. Hence, the seat 2 is defined by the bottom 4 and the borders 10, 11, 12, and 13. A microcircuit card inserted in such a seat 2 is laterally held between the borders 12 and 13. Also, the card is longitudinally retained between the borders 10 and 11 thanks to a flexible arm 9. Retention is ensured by the borders 10 and 11, whereas the flexible arm 9 allows to hold cards having slight width variations.

[0021] Moreover, in order to ensure the retention of the card in the seat 2 in the thickness direction, the border 11 has a release 14 disposed on an upper portion of the border 11, which is chamfered at its top to assist the sliding movement of the card and to pass above a top face of a card inserted in the seat 2. Similarly, the resilient arm 9 has a release 15 to cover the upper face of the card inserted in said. seat 2. The release 15 is similar to the release 14. Hence, the releases 14 and 15, in conjunction with the bottom 4, allow to limit the vertical mobility of the card inside the seat 2.

[0022] A first embodiment of a connector 1 according to the invention, as shown in Figure 1 comprises an resilient arm 9 such that the resilient arm 9 is retained by a foot 16 of the bottom 4. Here the foot 16 is centered with respect to the arm 9. The arm 9 is composed of two flexible tongues 17 and 18 on both sides of the foot 16. The foot 16 is such that it is aligned. with the border 10. Further, the flexible tongues 17 and 18 are such that each has an inwardly curved end, on both sides of the foot 16 directed towards the cavity 4. Hence, the structure formed by the arm 9 is shaped as a circle arc.

[0023] In accordance with this first embodiment, in order to vertically retain a card abutting against the resilient arm 9, the foot 16, as well as the flexible tongues 17 and 18 have upper releases. In fact, the foot 16 has an upper release 19 and the flexible tongues 17 and 18 of the arm 9 have each a release 15 at their free end. The releases 15 and 19 are disposed at the same height with respect to the bottom 4 of the seat 2. A height between a lower face of each of these releases 15 and 19 and the bottom 4 is of the same order as the thickness of a microcircuit card to be inserted in the housing 2, all functional clearances being accounted for, or slightly smaller.

[0024] The flexible tongues 17 and 18 have a particular shape. In fact, both tongues 17 and 18 have such a thickness that said thickness decreases progressively from a fastening point with the foot 16. For example, in the case of the resilient tongue 8, the thickness of an end 22 of the tongue 18 situated at the junction with the foot 16 is greater than the thickness at the end 23 of the tongue 18. As a result, when pressure is exerted, for instance, by an edge of a card forced against the end 23 of the resilient tongue 18, said pressure is distributed evenly over the resilient tongue 18, and not only at the attachment point 22. On the other hand, as shown in Figure 1, the bottom 18 slightly undercut of an area whereat the flexible tongues 17 and 18 snap.

[0025] Figure 3 shows a second embodiment of a connector 100 according to the invention. The structure of this connector 100 being similar as a whole to the one of the connector 1, common parts will be denoted by the same numerals. In Figure 3, the connector 100 is shown with a card 101 designed to be received in the seat 2 of the connector 100. The connector 100 has a flexible and resilient arm 9 such that this arm 9 is joined by one end, thereof 25 to a portion 26 of the border 10. Also, this resilient arm 9 has a free end 27 such that this end 27 is independent and free and faces a second portion 28 of the border 10. Assuming that the resilient arm 9 does not extend beyond a plane formed by the border 10, only the ends 25 and 27 belong to the plane formed by the border 10. The resilient arm 9 has a curved shape such that the curve it forms is oriented inwardly towards the seat 2. A curve center 29 of the arm 9 is preferably disposed of a median area, between the portions 26 and 28 of the border 10. Hence, the curve area 29 may exert a maximum pressure over a median area of a first edge 30 of the card 101. Further, when the card 101 is inserted obliquely in the connector 100, the edge 30 abuts against the resilient arm 9 and more particularly first against the curve area 29. The exertion of this pressure force results in that the resilient arm 9 is immediately pushed away from the plane formed by the border 10.

[0026] The resilient arm 9 has an upper release 31 like the releases 15 and 19 as shown in Figure 1. More precisely, the release 31 has a chamfer 32 to receive and abut against an upper face 33 of the card 101. When the edge 30, pushing against the curve area 29, abuts against the border 10, then the second edge 34 of the card 101 is pushed down towards the bottom 4 of the seat. Then, the pressure exerted on the curve area 29 is released 30 that the card 101 is allowed to abut against the border 11, and the releases like the release 14 of this border 11 overhang the upper face 33.

[0027] In a variant embodiment, it may be arranged that the resilient arm 9 consists of a strip 35 contained between the ends of the portions 26 and 28, as shown in Figure 3. Then, in this variant embodiment, as shown in Figure 4, resilient portions with releases 36 will be provided by delimiting separate sectors of the strip 35 by means of slits 37. The strip 35 also has releases 36 for retention of the upper face of a card inserted in the seat. In this embodiment, the strip 35 has slits 37 to assist the straightening of the curve of this strip under the

effect of a pressure exerted by a card edge. Then the slits 37 are arranged vertically, such that these slits 37 are generally orthogonal to the plane termed by the bottom 4.

[0028] Further, the housing 3 preferably has a notch 38. This notch 38, which may be cut, for instance, in the border 11 and/or in the bottom 4 of the seat 2 allows for easy handling of the card to be inserted in the seat 2 upon insertion and particularly upon removal thereof. In fact, this notch allows the passage of a finger for exerting pressure on the edge of the card.

[0029] When a microcircuit card is to be installed in such a connector, a first edge 30 is first pushed against the flexible arm 9 so that the flexible arm 9 moves back and until the edge 30 abuts against the border 10 of the connector. It is understood that, in order to perform this operation, the card has to be preferably disposed obliquely with respect to a plane formed by the bottom 4 of the connector. In fact, the edge 30 is disposed against the flexible arm 9 but abuts against the bottom 4 as well. Finally, when the edge 30 abuts against the border 10, a second edge 34 is pushed down against the bottom 4 so that the card is forced against the bottom 4 of the seat 2. The second edge 34 is preferably opposite the first edge 30. While the second edge is pushed down, the pressure exerted on the resilient arm 9 is maintained. Then, once the card is fully pressed against the bottom 4 of the seat 2, the pressure exerted by the edge 30 on the resilient arm 9 is preferably released from the notch area 38, so that the resilient arm 9 exerts an elastic pressure against the edge 30 to push the edge 34 of the card against the border 11, the card being removable by performing the same steps in the reverse direction. Further, assuming that the border 11 has a release 14, this release 14 overhangs the upper face 33 of the card.

[0030] Figure 5 shows a third embodiment of a connector 200 according to the invention. The structure of this connector 200 being similar as a whole to the one of the connector 1, common parts will be denoted by the same numerals. In Figure 5, the connector 200 is designed to have a cover 39 to retain a card to be inserted in the seat 2 of the connector 100. The connector 200 has a flexible and resilient arm 9 like the one of Figure 1.

[0031] The cover 39 is a flat plate such that it has two flexible tabs 40 and 41, each provided at its end with a pivot 42 and 43 respectively. The tabs 40 and 41 are parallel to each other. They are flexible, because the cover has a slit at each tab. For example, the tab 40 is defined within the frame of a rectangle formed by the cover 39, but it is flexible because the cover 39 has the slit 44, which also allows this tab 40 to be formed.

[0032] The pivots, or extensions, 42 and 43 are located in the apertures of the housing. In one embodiment, the extensions 42 and 43 have a cylindrical shape and are mounted perpendicular to an edge of the tab whereto they belong. Particularly, the extension 42 is retained in the aperture 45 and the extension 43 is retained in the aperture 46. In this embodiment, the apertures 45 and 46 are situated on both sides of the first border 10. A distance 47 between the apertures 45 and 46 is such that it is approximately equal to a width 48 of the cover 39. Assuming that the pivots 42 and 43 extend on both sides beyond this width 48, the cover 39 is mounted in the housing 3 by drawing the two resilient tabs closer so that each pivot may be situated before its aperture. Then the two resilient tabs are released and the pivots engage in their respective apertures.

[0033] A further advantageous arrangement of this system consists in using chamfers disposed on the releases 14 to allow the cover 39 to be clipped in position.

[0034] The aperture 45 is preferably wider than a diameter 49 of a pivot like the pivot 42. The same applies to the aperture 46, whose shape is identical to the one of the aperture 45. As is shown in Figure 6, the cover 39 has an axis of rotation 50 such that this axis of rotation 50 passes through the extensions 42 and 43. Further, the axis of rotation 50 may be translated parallel to the bottom 4 of the seat 2 and parallel to the first border 10, when the aperture is elongated. This translatory motion allows the introduction or the removal of the lugs 51 and 52 provided on a front edge 53 of the cover 39 in the receptacles 54 of the second border 11, said receptacles 54 being coincident therewith. The principle disclosed herein for cover rotation may be reverted, with receptacles being provided in the cover and lugs on the edge in coincidence with the receptacles.

[0035] The pivots 42 and 43 and the lugs 51 and 52 allow to keep the cover 39 in a fixed position, further allowing the retention of a card in the seat 2. This variant embodiment of the invention with a cover allows to ensure the perfect flatness of the card in the seat, particularly under varying temperature conditions which may affect the rigidity of the card. For instance, as temperature rises, such a card may become softer and its surface may be curved. In fact, the contacts exert a pressure force against the card which, as it softens under the effect of rising temperature, tends to sag, which involves an increase of contact resistances. When the card becomes softer under the effect of this pressure, it sags and is no longer in contact with the contacts 5 situated on the bottom 4 of the seat 2. The cover 39 allows to prevent curving of the card, and ensures perfect flatness and preserved contact of the card against the contacts 5.

[0036] In a preferred embodiment, the cover 39 has flutes 55 on an upper face 56 to assist the translation of the cover parallel to the bottom 4.

[0037] The cover 39 provides no added thickness if, when it is snapped in position, the upper face 56 is aligned with the upper faces of the releases 14 and 15 of the first and second borders 10 and 11.

Claims

1. A microcircuit card connector (1) having a housing

(3) with a card seat (2) and contact blades (5) intended to come in contact with the conductive segments of the microcircuit, said blades being provided over a bottom (4) of the housing against which the card is placed, characterized in that the housing includes a first border (10) having an arm (9) which is aligned with said border and is flexible to hold the card against a second border (11) of the housing, said second border being opposite the first border, the flexible arm having at least one free end (23, 27) which elastically snaps towards the second border when the card 18 seated, to let the latter come to abutment in a predetermined position.

2. A connector as claimed in claim 1, characterized in that the flexible arm is attached to the first border by one end (25) only.

3. A connector as claimed in claim 1, characterized in that the flexible arm is attached to the seat bottom by a foot (15) which is centered on the arm and has two flexible tongues (17,18) on both sides of the foot.

4. A connector as claimed in claim 3, characterized in that the foot and the two flexible tongues have releases (15, 19) to cover a portion of the upper surface of the card.

5. A connector as claimed in any claims 1 to 4, characterized in that the housing has a movable cover (39) , such that an axis of rotation (50) of the cover is parallel and close to the first border.

6. A connector as claimed in claim 5 characterized in that the cover is retained in the housing by extensions (42, 43, 51, 52) locked in apertures (45, 46, 54) of the housing borders.

7. A connector as claimed in any claims 5 to 6, characterized in that the cover has receptacles for retaining lugs of a housing border.

8. A connector as claimed in any claims 1 to 7, characterized in that the tongues have a thickness which decreases from a foot fastening point (22) to an end (23) of the tongue.

9. A connector as claimed in any claims 1 to 8, characterized in that the flexible arm forms the first border and includes a long strip (35) with vertical slits (37) so that an inwardly curved strip, directed towards the seat of the housing is provided.

10. A connector as claimed in any claims 1 to 9, characterized in that the flexible arm has a chamfered release (15, 19, 31, 36) to cover a portion of the upper face (33) of the card.

11. A connector as claimed in any claims 1 to 10, characterized in that the housing has a notch (38) on the side of the second border.

12. A connector as claimed in any claims 1 to 11, characterized in that the borders have releases (14) which cover portions of an upper face of the card.

13. A connector a claimed in any claim 1 to 12, characterized in that the first border is flexible in order to receive an edge (30) of the card in the seat of the housing.

14. A process for installing a microcircuit card in a connector (1), characterized in that it includes the following steps:

- placing a first edge (30) of the card (101) against a first flexible (9) border (10) of a connector housing (3), so that the card forms an acute angle with a plane of a housing bottom (4);
- pushing down a second edge (34) of the card, said second edge being opposite the first edge, by deforming the flexible border thanks to a pressure exerted on the first edge;
- placing the card parallel to the bottom;
- releasing the pressure exerted on the flexible border to place a portion of an upper face of the card beneath a release (14) of a second border (11).

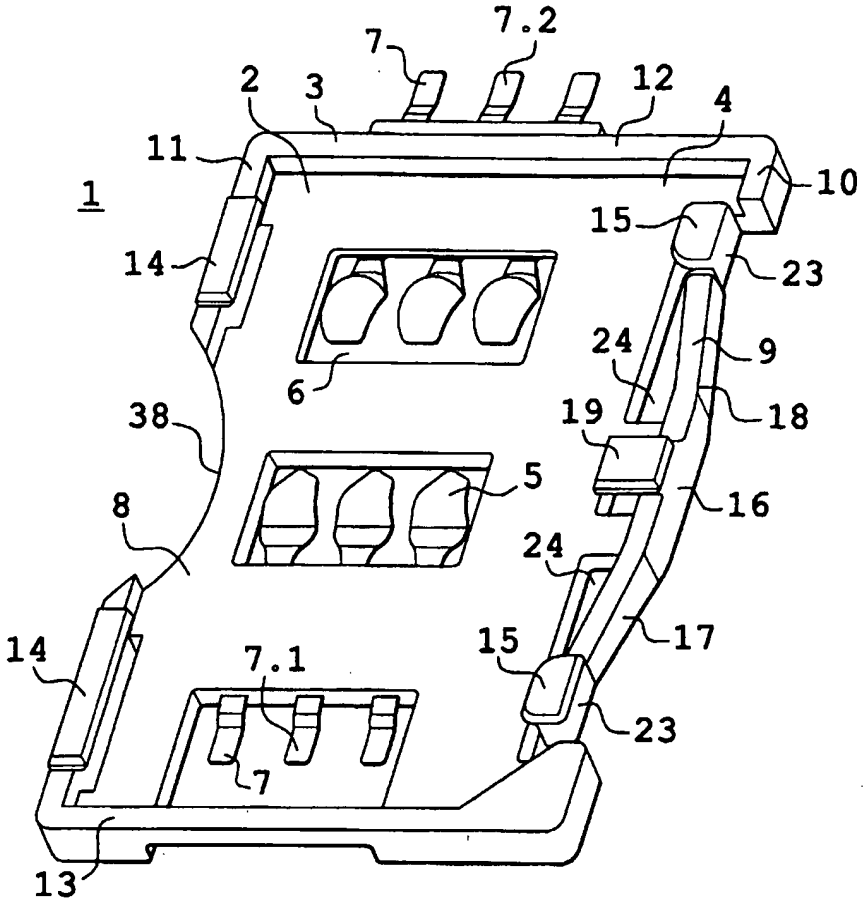
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Fig. 1

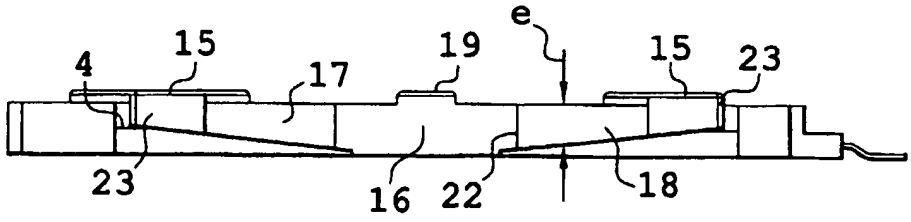
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Fig. 2

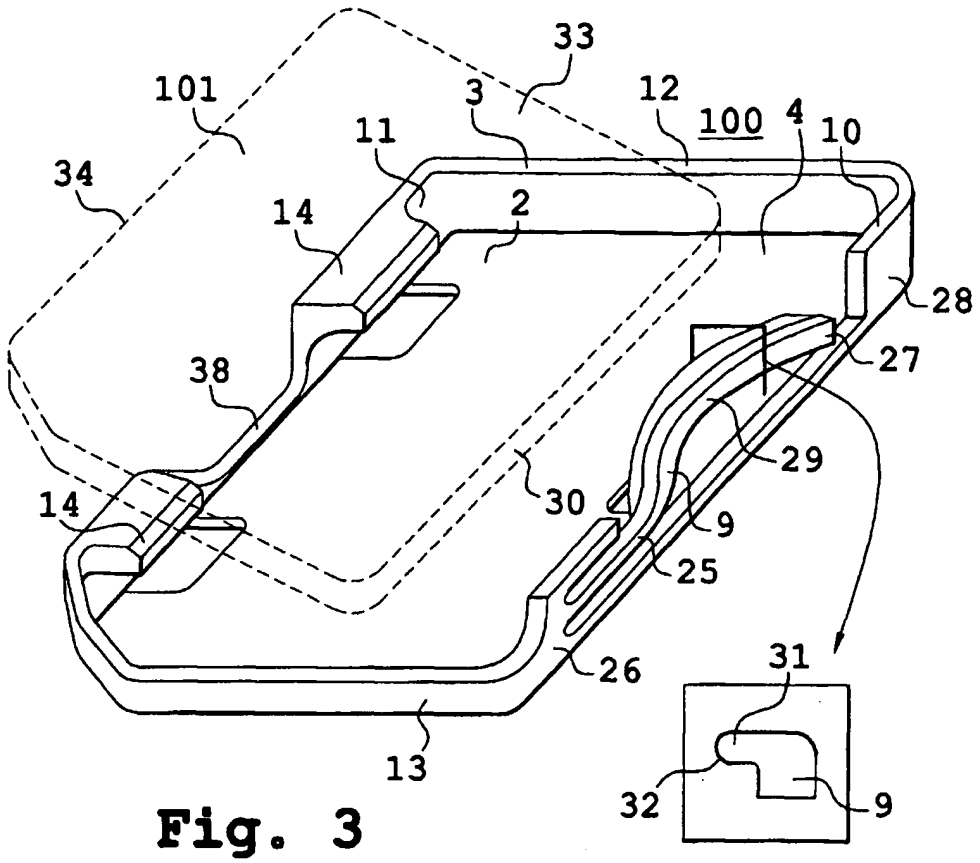
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Fig. 3

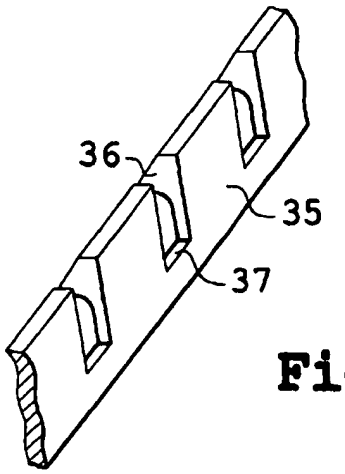
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Fig. 4

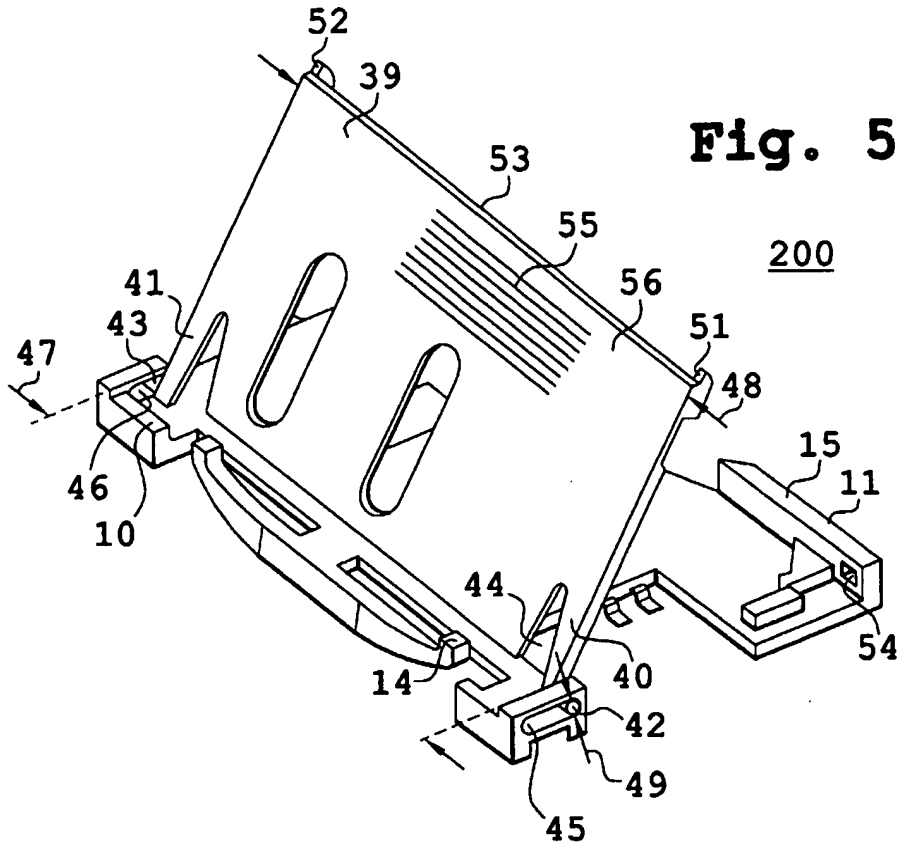
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Fig. 5

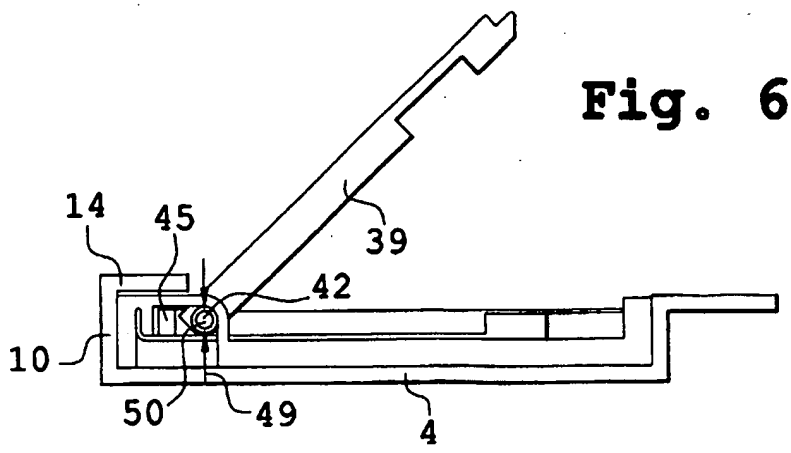
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Fig. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 40 3611

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 520 080 A (MOLEX INC) 30 December 1992 (1992-12-30) * column 3, line 16 - column 5, line 54 *	1,5	H01R12/16 G06K7/00
A	US 5 944 549 A (HSIAO YU-SAN ET AL) 31 August 1999 (1999-08-31) * column 2, line 22 - column 3, line 63 *	6	
A	US 3 701 071 A (LANDMAN DIRK) 24 October 1972 (1972-10-24) * column 2, line 54 - column 9, line 6 *	1-14	
A	US 5 257 414 A (STINAUER ROBERT J ET AL) 26 October 1993 (1993-10-26) * column 2, line 12 - column 4, line 33 *	1-14	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H01R
G06K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23 March 2001	Demol, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 40 3611

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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23-03-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0520080 A	30-12-1992	DE 69104350 D	03-11-1994
		DE 69104350 T	16-02-1995
		US 5226826 A	13-07-1993
US 5944549 A	31-08-1999	NONE	
US 3701071 A	24-10-1972	NONE	
US 5257414 A	26-10-1993	DE 4138342 A	27-05-1992
		FR 2670926 A	26-06-1992
		GB 2251505 A,B	08-07-1992

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 111 721 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
24.09.2003 Bulletin 2003/39

(51) Int Cl.[7]: **H01R 12/16**, G06K 7/00

(21) Application number: **00403611.7**

(22) Date of filing: **20.12.2000**

(54) **Microcircuit card connector and process for installing the card in such connector**

Elektrischer Verbinder für eine Mikroschaltungskarte und elektrische Verbindungsdose mit dieser Vorrichtung

Connecteur pour carte à microcircuit et procédé de montage d'une telle carte dans ce connecteur

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR

(30) Priority: **22.12.1999 FR 9916218**

(43) Date of publication of application:
27.06.2001 Bulletin 2001/26

(73) Proprietor: **FCI**
75009 Paris (FR)

(72) Inventors:
- **Camacho, Gabriel**
  57310 Guenange (FR)
- **Cabane, Francis**
  39100 Dole (FR)
- **Cailler, Olivier**
  25300 Pontarlier (FR)

(74) Representative: **Schmit, Christian Norbert Marie**
Cabinet Christian Schmit et Associés,
8, place du Ponceau
95000 Cergy (FR)

(56) References cited:
EP-A- 0 520 080
US-A- 3 701 071
US-A- 5 257 414
US-A- 5 944 549

EP 1 111 721 B1

Description

[0001] The present invention relates to a microcircuit card connector. It also relates to a process for installing; the card in such a connector. More particularly, it finds use in the field of chip card connectors, especially in the field of electronic minicard connectors. These connectors are generally designed to be installed in electronic apparatuses of small size and volume, typically in «pocket» apparatuses, such as portable radiotelephones. In prior art, connectors are known for receiving such microcircuit cards, such that a connector has both means for retaining the card in a connector space, and means for holding the card against the contacts of this connector. The interest of the invention lies in that it provides a connector having a simple means to retain the card in the connector in a position in which it is connected with the connector contacts.

[0002] In prior art, a connector is particularly known from the principle of document US-A-5,320,552, which has a housing that forms a seat for a microcircuit card and has contacts at the bottom of this seat to come in contact with conductive segments of the microcircuit, The seat of this connector has a shape which is complementary to a volume defined by the card to be inserted in this connector. Hence, the distances between the borders of the seat are adjusted to correspond to the card size. In order to assure the quality of contact between the conductive segments of the microcircuit and the connector contacts, this connector has a cover. According to this document, the cover may be pivoted between an open and a closed position. In the closed position, a lower face of the cover abuts against the microcircuit card in such a manner as to press the conductive segments of the latter against the contacts of the connector. As a result, the cover prevents any vertical mobility of the card in its seat.

[0003] The microcircuit card is held in this connector by a first border set and by a second border set, the second border set being orthogonal to the first border set. These borders allow to delimit the seat. They prevent any longitudinal and lateral mobility of the card in the seat of the connector. Nevertheless, to this end, the seat size must be perfectly adjusted to fit the size of a card to be inserted, which is not easily obtained.

[0004] Such prior art connector involves a problem. Its structure is complex due to the use of a pivoting cover and, in addition, the connector is bulky due to the added thickness of the cover.

[0005] An additional shortcoming of such a type of connector is related to the fragility of its structure. In fact, in such a connector, the cover is attached to the housing by means of a mechanical joint. Since this mechanical joint is miniature-sized, it is fragile.

[0006] Also, a prior art microcircuit card connector is known from the principle of document EP-A-0 515 897. This connector also has a housing with a card seat. The seat is provided in such a manner that contacts are provided over a bottom of the seat to contact the conductive segments of the microcircuit. In order to retain the card in its seat, the housing has on a first side a groove to receive a first edge of the card and, on a second side, opposite to the first side, a tip. The tip is able to be translated parallel to the bottom of the seat. An other connector known from the prior art comprises a tip which is rotationally flexible. When a first edge of the card is locked in the groove, and the card is pushed down into the seat, a second edge of the card abuts against this chamfered tip. Then the flexible tip is slightly pushed inwardly towards the seat, which is partially undercut in that area, to allow the passage of the card and properly position it in its seat.

[0007] Further, the card is held vertically in its seat by releases of the groove and by the presence of the tip cooperating with a resilient lever which is provided on the lower face of the housing. Conversely, the longitudinal and. lateral mobility of the card inside the seat is only assured by the fixed borders of the seat. As a result, in order to prevent any movement of the card inside its seat, the size of said seat must be strictly complementary, any clearance being accounted for, to the card shape.

[0008] Such type of prior art connector also has a problem. The card-receiving structure of the housing is fragile. The housing uses two flexible means, the tip on the one hand and the resilient lever on the other. Now, in order to properly insert a card in this connector, a strong pressure force must be exerted on the flexible tip. Also, in order to remove a microcircuit card inserted in such connector, the lock generated by the flexible tip must be released. To this end, a rotary force must be exerted on the axle about which said tip rotates. This axle is fragile, because it is attached to the edges of the housing by thin structures. In fact, these structures are specially designed to be thin to allow these rotary movements. Hence, there is the risk of rupturing these thin structures , thereby making the connector useless.

[0009] Also, an intrinsic variability of chip card sizes exists and is associated to production processes. Hence, a wider seat must be provided to accept the maximum number of cards. However, in this case the card is positioned in an insecure manner in its seat, and may even float therein.

[0010] The present invention has the object to solve both size and fragility problems of prior art connectors and variability problems, by providing a connector having a flexible member which causes a translation of the card in a seat of a housing of the connector, to retain said card in a fixed position in the seat. Therefore, the invention provides a housing such that on one side of the seat, a fixed border of the housing has overhanging releases to cover a first portion of a top surface of the card to be inserted in the seat. Also, on a second side, preferably opposite said first side, the housing has a flexible arm, situated within the dimensions of a frame formed by the housing. This arm is only fastened at one

point of the border. The flexible arm has a free end which snaps inwardly towards the seat by elastic translation, parallel to the card plane, in such a manner as to force a card seated therein against the first border.

[0011] On the other hand, this flexible arm also has an upper release to additionally cover a portion of the upper face of the card. Such a connector generally has contacts ever its bottom to provide contact with the conductive segments situated on the microcircuit card. In f act, such type of connector la specially conceived to receive microcircuit minicards.

[0012] In order to insert a microcircuit card in a connector according to the invention, a first edge of the card must be placed beneath the releases of the flexible arm. Then, pressure is applied on the card, which is disposed obliquely with respect to the seat bottom, to displace the card parallel to said bottom, an to deform the free end of the flexible am. The flexible arm moves back until the first edge comes in contact with the borders situated level with the arm. Then, a second edge of the card, said second edge being opposite the first edge, is pushed down. When said second edge is pushed down into the seat, the card abuts against the contacts contained at the bottom of the seat. Once the card is parallel to the seat bottom the pressure against the resilient arm is released, to let the card abut, under the effect of the pressure exerted by the resilient am, against the first border of the housing. Then, the releases provided on this first border of the housing overhang a portion of the card.

[0013] Therefore, the card is held vertically by a cooperation between the seat bottom and the releases provided on each of the borders. Also, this card is held longitudinally by means of the resilient am which forces the card against the second border of the housing. According to the invention, a lateral mobility of the card inside the housing has no adverse effect until such a connector may be provided whose size is finely adjusted according to the lateral orientation of the card. Alternatively, such a connector may be provided that the contacts provided over the seat bottom may abut against the most important segments of a microcircuit situated on a card to be inserted in this seat.

[0014] Therefore, the invention relates to a microcircuit card connector according to claim 1.

[0015] The invention also relates to a process for installing a microcircuit card in a connector according to claim 11.

[0016] The invention will be understood more clearly by reading the following description with reference to the accompanying figures. The latter are only shown by way of example and do not intend to limit the invention in any manner. The figures show:

- Figure 1: a top perspective view of a first embodiment of a connector according to the invention;
- Figure 2: a sectional view of the first embodiment of the connector according to the invention;
- Figure 4: a top perspective view of a variant of the connector according to the invention;
- Figure 5: a top perspective view of a third embodiment of a connector according to the invention;
- Figure 6: a sectional view of the third embodiment of the connector according to the invention.

[0017] Figure 1 shows a connector 1 according to the invention. The connector 1 is designed to receive a microcircuit card (not shown) in a seat 2 of a housing 3. The housing 3 particularly includes a bottom 4 whereat contacts 5 are provided, which are to come in contact with conductive segments of a microcircuit situated on a card which can be inserted in the seat 2.

[0018] In a preferred embodiment of the invention, the contacts 5 are metal resilient blades which may be, for instance, molded inside the housing 3. In this embodiment, as shown in Figure 1, the housing 3 includes a bottom 4 having an aperture 6 wherefrom the active conductive portions of these contact blades 5 appear. In this embodiment, the contact blades 5 are preferably provided level with the bottom 4. Also, the contact blades 5 have contact tabs 7 to be welded, for instance, on a printed beard. These contact tabs 7 may be provided in the space delimited by the frame of the housing 3, as in the case of contact blades 7.1 which are provided in an aperture like the aperture 6. However, they may be also provided at a peripheral side of the frame of the housing 3, as in the case of the contact tabs 7.2.

[0019] The connector 1 has a resilient arm 9, such that said resilient arm 9 is included in a frame delimited by the borders of the housing 3. In fact, the housing 3 particularly has a first border 10 such that said first border 10 defines a plane which does not extend beyond the resilient arm 9. In one embodiment, as shown in Figure 1, the resilient arm 9 is inwardly curved towards the seat 2. Therefore, the resilient arm 9 may be pushed from this position in which it 18 inwardly curved towards the seat 2, to a second position in which it is partly aligned with the border 10.

[0020] The housing 3 has a second border 11, such that this second border 11 is opposite the first border 10. The second border 11 is fixed. It is also rigid. The housing 3 further includes a third border 12 and a fourth border 13. The borders 12 and 13 are preferably perpendicular to the borders 10 and 11, which are parallel to each other. The frame defined by the housing 3 has a generally rectangular shape. Hence, the seat 2 is defined by the bottom 4 and the borders 10, 11, 12, and 13. A microcircuit card inserted in such a seat 2 is laterally held between the borders 12 and 13. Also, the card is longitudinally retained between the borders 10 and 11 thanks to a flexible arm 9. Retention is ensured by the borders 10 and 11, whereas the flexible arm 9 allows to hold cards having slight width variations.

[0021] Moreover, in order to ensure the retention of the card in the seat 2 in the thickness direction, the border 11 has a release 14 disposed on an upper portion of the border 11, which is chamfered at its top to assist

the sliding movement of the card and to pass above a top face of a card inserted in the seat 2. Similarly, the resilient arm 9 has a release 15 to cover the upper face of the card inserted in said. seat 2. The release 15 is similar to the release 14. Hence, the releases 14 and 15, in conjunction with the bottom 4, allow to limit the vertical mobility of the card inside the seat 2.

[0022] A first embodiment of a connector 1 according to the invention, as shown in Figure 1 comprises an resilient arm 9 such that the resilient arm 9 is retained by a foot 16 of the bottom 4. Here the foot 16 is centered with respect to the arm 9. The arm 9 is composed of two flexible tongues 17 and 18 on both sides of the foot 16. The foot 16 is such that it is aligned. with the border 10. Further, the flexible tongues 17 and 18 are such that each has an inwardly curved end, on both sides of the foot 16 directed towards the cavity 4. Hence, the structure formed by the arm 9 is shaped as a circle arc.

[0023] In accordance with this first embodiment, in order to vertically retain a card abutting against the resilient arm 9, the foot 16, as well as the flexible tongues 17 and 18 have upper releases. In fact, the foot 16 has an upper release 19 and the flexible tongues 17 and 18 of the arm 9 have each a release 15 at their free end. The releases 15 and 19 are disposed at the same height with respect to the bottom 4 of the seat 2. A height between a lower face of each of these releases 15 and 19 and the bottom 4 is of the same order as the thickness of a microcircuit card to be inserted in the housing 2, all functional clearances being accounted for, or slightly smaller.

[0024] The flexible tongues 17 and 18 have a particular shape. In fact, both tongues 17 and 18 have such a thickness that said thickness decreases progressively from a fastening point with the foot 16. For example, in the case of the resilient tongue 8, the thickness of an end 22 of the tongue 18 situated at the junction with the foot 16 is greater than the thickness at the end 23 of the tongue 18. As a result, when pressure is exerted, for instance, by an edge of a card forced against the end 23 of the resilient tongue 18, said pressure is distributed evenly over the resilient tongue 18, and not only at the attachment point 22. On the other hand, as shown in Figure 1, the bottom 18 slightly undercut of an area whereat the flexible tongues 17 and 18 snap.

[0025] In a variant embodiment, as shown in Figure 4, resilient portions with releases 36 will be provided by delimiting separate sectors of the strip 35 by means of slits 37. The strip 35 also has releases 36 for retention of the upper face of a card inserted in the seat. In this embodiment, the strip 35 has slits 37 to assist the straightening of the curve of this strip under the effect of a pressure exerted by a card edge. Then the slits 37 are arranged vertically, such that these slits 37 are generally orthogonal to the plane termed by the bottom 4.

[0026] Further, the housing 3 preferably has a notch 38. This notch 38, which may be cut, for instance, in the border 11 and/or in the bottom 4 of the seat 2 allows for easy handling of the card to be inserted in the seat 2 upon insertion and particularly upon removal thereof. In fact, this notch allows the passage of a finger for exerting pressure on the edge of the card.

[0027] When a microcircuit card is to be installed in such a connector, a first edge 30 is first pushed against the flexible arm 9 so that the flexible arm 9 moves back and until the edge 30 abuts against the border 10 of the connector. It is understood that, in order to perform this operation, the card has to be preferably disposed obliquely with respect to a plane formed by the bottom 4 of the connector. In fact, the edge 30 is disposed against the flexible arm 9 but abuts against the bottom 4 as well. Finally, when the edge 30 abuts against the border 10, a second edge 34 is pushed down against the bottom 4 so that the card is forced against the bottom 4 of the seat 2. The second edge 34 is preferably opposite the first edge 30. While the second edge is pushed down, the pressure exerted on the resilient arm 9 is maintained. Then, once the card is fully pressed against the bottom 4 of the seat 2, the pressure exerted by the edge 30 on the resilient arm 9 is preferably released from the notch area 38, so that the resilient arm 9 exerts an elastic pressure against the edge 30 to push the edge 34 of the card against the border 11, the card being removable by performing the same steps in the reverse direction. Further, assuming that the border 11 has a release 14, this release 14 overhangs the upper face 33 of the card.

[0028] Figure 5 shows a third embodiment of a connector 200 according to the invention. The structure of this connector 200 being similar as a whole to the one of the connector 1, common parts will be denoted by the same numerals. In Figure 5, the connector 200 is designed to have a cover 39 to retain a card to be inserted in the seat 2 of the connector 100. The connector 200 has a flexible and resilient arm 9 like the one of Figure 1.

[0029] The cover 39 is a flat plate such that it has two flexible tabs 40 and 41, each provided at its end with a pivot 42 and 43 respectively. The tabs 40 and 41 are parallel to each other. They are flexible, because the cover has a slit at each tab. For example, the tab 40 is defined within the frame of a rectangle formed by the cover 39, but it is flexible because the cover 39 has the slit 44, which also allows this tab 40 to be formed.

[0030] The pivots, or extensions, 42 and 43 are located in the apertures of the housing. In one embodiment, the extensions 42 and 43 have a cylindrical shape and are mounted perpendicular to an edge of the tab whereto they belong. Particularly, the extension 42 is retained in the aperture 45 and the extension 43 is retained in the aperture 46. In this embodiment, the apertures 45 and 46 are situated on both sides of the first border 10. A distance 47 between the apertures 45 and 46 is such that it is approximately equal to a width 48 of the cover 39. Assuming that the pivots 42 and 43 extend on both sides beyond this width 48, the cover 39 is mounted in the housing 3 by drawing the two resilient tabs closer so that each pivot may be situated before its aperture. Then

the two resilient tabs are released and the pivots engage in their respective apertures.

[0031] A further advantageous arrangement of this system consists in using chamfers disposed on the releases 14 to allow the cover 39 to be clipped in position.

[0032] The aperture 45 is preferably wider than a diameter 49 of a pivot like the pivot 42. The same applies to the aperture 46, whose shape is identical to the one of the aperture 45. As is shown in Figure 6, the cover 39 has an axis of rotation 50 such that this axis of rotation 50 passes through the extensions 42 and 43. Further, the axis of rotation 50 may be translated parallel to the bottom 4 of the seat 2 and parallel to the first border 10, when the aperture is elongated. This translatory motion allows the introduction or the removal of the lugs 51 and 52 provided on a front edge 53 of the cover 39 in the receptacles 54 of the second border 11, said receptacles 54 being coincident therewith. The principle disclosed herein for cover rotation may be reverted, with receptacles being provided in the cover and lugs on the edge in coincidence with the receptacles.

[0033] The pivots 42 and 43 and the lugs 51 and 52 allow to keep the cover 39 in a fixed position, further allowing the retention of a card in the seat 2. This variant embodiment of the invention with a cover allows to ensure the perfect flatness of the card in the seat, particularly under varying temperature conditions which may affect the rigidity of the card. For instance, as temperature rises, such a card may become softer and its surface may be curved. In fact, the contacts exert a pressure force against the card which, as it softens under the effect of rising temperature, tends to sag, which involves an increase of contact resistances. When the card becomes softer under the effect of this pressure, it sags and is no longer in contact with the contacts 5 situated on the bottom 4 of the seat 2. The cover 39 allows to prevent curving of the card, and ensures perfect flatness and preserved contact of the card against the contacts 5.

[0034] In a preferred embodiment, the cover 39 has flutes 55 on an upper face 56 to assist the translation of the cover parallel to the bottom 4.

[0035] The cover 39 provides no added thickness if, when it is snapped in position, the upper face 56 is aligned with the upper faces of the releases 14 and 15 of the first and second borders 10 and 11.

Claims

1. A microcircuit card connector (1) having a housing (3) with a card seat (2) and contact blades (5) intended to come in contact with the conductive segments of the microcircuit, said blades being provided over a bottom (4) of the housing against which the card is placed, the housing including a first border (10) having an arm (9) which is aligned with said border and is flexible to hold the card against a second border (11) of the housing, said second border having releases (14) covering portions of an upper face (33) of the card, the flexible arm having at least one free end (23, 27) which elastically snaps towards the second border when the card (18) is seated, to let the latter come to abutment in a predetermined position, **characterised in that** the flexible arm is attached to the seat bottom by a foot (16) which is centred on the arm and has two flexible tongues (17, 18) on both sides of the foot.

2. A connector as claimed in claim 1, **characterised in that** the foot and the two flexible tongues have releases (15, 19) to cover a portion of the upper surface of the card.

3. A connector as claimed in any claims 1 to 2, **characterised in that** the housing has a movable cover (39), such that an axis of rotation (50) of the cover is parallel and close to the first border.

4. A connector as claimed in claim 3 **characterised in that** the cover is retained in the housing by extensions (42, 43, 51, 52) locked in apertures (45, 46, 54) of the housing borders.

5. A connector as claimed in any claims 1 to 4, **characterised in that** the cover has receptacles for retaining lugs of a housing border.

6. , A connector as claimed in any claims 1 to 5, **characterised in that** the tongues have a thickness which decreases from a foot fastening point (22) to an end (23) of the tongue.

7. A connector as claimed in any claims 1 to 6, **characterised in that** the flexible arm forms the first border and includes a long strip (35) with vertical slits (37) so that an inwardly curved strip, directed towards the seat of the housing is provided.

8. , A connector as claimed in any claims 1 to 7, **characterised in that** the flexible arm has a chamfered release (15, 19, 31, 36) to cover a portion of the upper face (33) of the card.

9. A connector as claimed in any claims 1 to 8, **characterised in that** the housing has a notch (38) on the side of the second border.

10. A connector as claimed in any claims 1 to 9, **characterised in that** the first border is flexible in order to receive an edge (30) of the card in the seat of the housing.

11. A process for installing a microcircuit card in a connector (1), **characterised in that** it includes the following steps:

- pushing a first edge (30) of the card (101) against two flexible tongues of a first flexible arm (9) of a border (10) of a connector housing (3) said flexible tongues being attached to a seat bottom of said connector housing by a foot which is centered on the arm; and the card forming an acute angle with a plane of a bottom (4) of said connector housing;
- pushing down a second edge (34) of the card, said second edge being opposite the first edge, while maintaining the pressure exerted on the flexible arm by the first edge;
- placing the card parallel to the bottom;
- releasing the pressure exerted on the flexible arm to place a portion of an upper face of the card beneath a release (14) of a second border (11) of the connector housing.

Patentansprüche

1. Mikroschaltungskartenverbinder (1), der ein Gehäuse (3) mit einem Kartensitz (2) und Kontaktmessem (5) aufweist, die dazu bestimmt sind, mit den leitenden Segmenten der Mikroschaltung in Kontakt zu gelangen, wobei die Messer über einem Boden (4) des Gehäuses vorgesehen sind, gegen den die Karte angeordnet wird, wobei das Gehäuse einen ersten Rand (10) mit einem Arm (9) aufweist, der mit dem Rand fluchtet und elastisch ist, um die Karte gegen einen zweiten Rand (11) des Gehäuses zu halten, wobei die zweite Kante Überstände (14) aufweist, die Abschnitt einer Oberseite (33) der Karte bedecken, wobei der elastische Arm mindestens ein freies Ende (23, 27) aufweist, das elastisch zum zweiten Rand hin einschnappt, wenn die Karte (18) eingesetzt ist, um letztere in einer vorbestimmten Stellung in Anschlag kommen zu lassen, **dadurch gekennzeichnet, dass** der elastische Arm am Sitzboden über einen Fuß (16) befestigt ist, der auf den Arm zentriert ist und zwei elastische Zungen (17, 18) auf beiden Seiten des Fußes aufweist.

2. Verbinder nach Anspruch 1, **dadurch gekennzeichnet, dass** der Fuß und die beiden elastischen Zungen Überstände (15, 19) aufweisen, um einen Abschnitt der Oberfläche der Karte zu bedecken.

3. Verbinder nach einem der Ansprüche 1 und 2, **dadurch gekennzeichnet, dass** das Gehäuse einen beweglichen Deckel (39) aufweist, derart, dass eine Drehachse (50) des Deckels parallel zu und nahe der ersten Kante liegt.

4. Verbinder nach Anspruch 3, **dadurch gekennzeichnet, dass** der Deckel im Gehäuse durch Vorsprünge (42, 43, 51, 52) zurückgehalten wird, die in Öffnungen (45, 46, 54) der Gehäuseränder verriegelt sind.

5. Verbinder nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der Deckel Aufnahmen zum Halten von Nasen eines Gehäuserands aufweist.

6. Verbinder nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** die Zungen eine Dikke haben, die von einem Fußbefestigungspunkt (22) zu einem Ende (23) der Zunge abnimmt.

7. Verbinder nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** der elastische Arm den ersten Rand bildet und einen langen Streifen (35) mit senkrechten Schlitzen (37) aufweist, wodurch ein zum Sitz des Gehäuses gerichteter, nach innen gekrümmter Streifen geliefert wird.

8. Verbinder nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** der elastische Arm einen abgeschrägten Überstand (15, 19, 31, 36) aufweist, um einen Abschnitt der Oberfläche (33) der Karte zu bedecken.

9. Verbinder nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** das Gehäuse auf der Seite des zweiten Rands eine bogenförmige Aussparung (38) aufweist.

10. Verbinder nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** der erste Rand elastisch ist, um eine Kante (30) der Karte im Sitz des Gehäuses aufzunehmen.

11. Verfahren zum Einsetzen einer Mikroschaltungskarte in einen Verbinder (1), **dadurch gekennzeichnet, dass** es die folgenden Schritte aufweist:

    - Drücken einer ersten Kante (30) der Karte (101) gegen zwei elastische Zungen eines ersten elastischen Arms (9) eines Rands (10) eines Verbindergehäuses (3), wobei die elastischen Zungen an einem Sitzboden des Verbindergehäuses durch einen Fuß befestigt sind, der auf den Arm zentriert ist, und die Karte einen spitzen Winkel mit einer Ebene eines Bodens (4) des Verbindergehäuses bildet,
    - Drücken einer zweiten Kante (34) der Karte nach unten, wobei diese zweite Kante der ersten Kante gegenüberliegt, während der von der ersten Kante auf den elastischen Arm ausgeübte Druck beibehalten wird,
    - Anordnen der Karte parallel zum Boden,
    - Lösen des auf den elastischen Arms ausgeübten Drucks, um einen Abschnitt einer Oberseite der Karte unter einen Überstand (14) eines

zweiten Rands (11) des Verbindergehäuses zu bringen.

Revendications

1. Connecteur (1) pour carte à microcircuit comportant un boîtier (3) muni d'un logement (2) pour recevoir la carte et de lames de contact (5) pour venir au contact de plages conductrices du microcircuit, ces lames étant présentées sur un fond (4) du logement contre lequel est placée la carte, le boîtier comportant une première bordure (10) munie d'un bras (9) aligné le long de cette bordure et flexible pour maintenir la carte contre une deuxième bordure (11) du boîtier, cette deuxième bordure comportant des décrochements (14) venant couvrir des portions d'une face supérieure (33) d'une carte (18), le bras flexible comportant au moins une extrémité libre (23, 27) qui se rabat élastiquement vers la deuxième bordure lorsque la carte est insérée, pour sa mise en butée dans une position prédéterminée, **caractérisé en ce que** le bras flexible est attaché au fond du logement par un piétement (16) centré sur le bras, et présentant deux languettes flexibles (17, 18) de part et d'autre du piétement.

2. Connecteur selon la revendication 1 **caractérisé en ce que** le piétement et les deux languettes flexibles comportent des décrochements (15, 19) pour venir recouvrir une portion de la face supérieure (33) de la carte.

3. Connecteur selon l'une des revendications 1 à 2 **caractérisé en ce que** le boîtier comporte un couvercle (39) mobile, tel qu'un axe de rotation (50) du couvercle est parallèle et proche de la première bordure.

4. Connecteur selon la revendication 3 **caractérisé en ce que** le couvercle est retenu dans le boîtier par des extensions (42, 43, 51, 52) bloquées dans des ouvertures (45, 46, 54) des bordures du boîtier.

5. Connecteur selon l'une des revendications 1 à 4 **caractérisé en ce que** le couvercle comporte des alvéoles pour y retenir des ergots d'une bordure du boîtier.

6. Connecteur selon l'une des revendications 1 à 5 **caractérisé en ce que** les languettes ont une épaisseur diminuant entre un point d'attache (22) au piétement et une extrémité (23) de la languette.

7. Connecteur selon l'une des revendications 1 à 6 **caractérisé en ce que** le bras flexible forme la première bordure et comporte une bande longue (35) munie de fentes verticales (37) de manière à proposer une bande courbée vers l'intérieur du logement du boîtier.

8. Connecteur selon l'une des revendications 1 à 7 **caractérisé en ce que** le bras flexible comporte un décrochement chanfreiné (15, 19, 31, 36) pour couvrir une portion de la face supérieure de la carte.

9. Connecteur selon l'une des revendications 1 à 8 **caractérisé en ce que** le boîtier comporte une encoche (38) du côté de la deuxième bordure.

10. Connecteur selon l'une des revendications 1 à 9 **caractérisé en ce que** la première bordure est flexible pour recevoir un chant (30) d'insertion de la carte dans le logement.

11. Procédé de montage d'une carte à microcircuit dans un connecteur (1) **caractérisé en ce qu'**il comporte les étapes suivantes :

    - on place un premier chant (30) de la carte (101) contre deux languettes flexibles d'un premier bras flexible (9) d'une bordure (10) d'un boîtier (3) du connecteur, lesquelles languettes flexibles étant attachées à un fond du logement du connecteur par un empiétement qui est centré sur le bras, et laquelle carte formant un angle aigu avec un plan d'un fond (4) du boîtier ;
    - on abaisse un deuxième chant (34) de la carte, ce deuxième chant étant opposé au premier chant, en déformant la bordure flexible par l'exercice d'une contrainte par l'intermédiaire du premier chant;
    - on place la carte parallèlement au fond ;
    - on relâche la contrainte exercée sur la bordure flexible de manière à placer une portion d'une face supérieure de la carte sous un décrochement (14) d'une deuxième bordure (11).

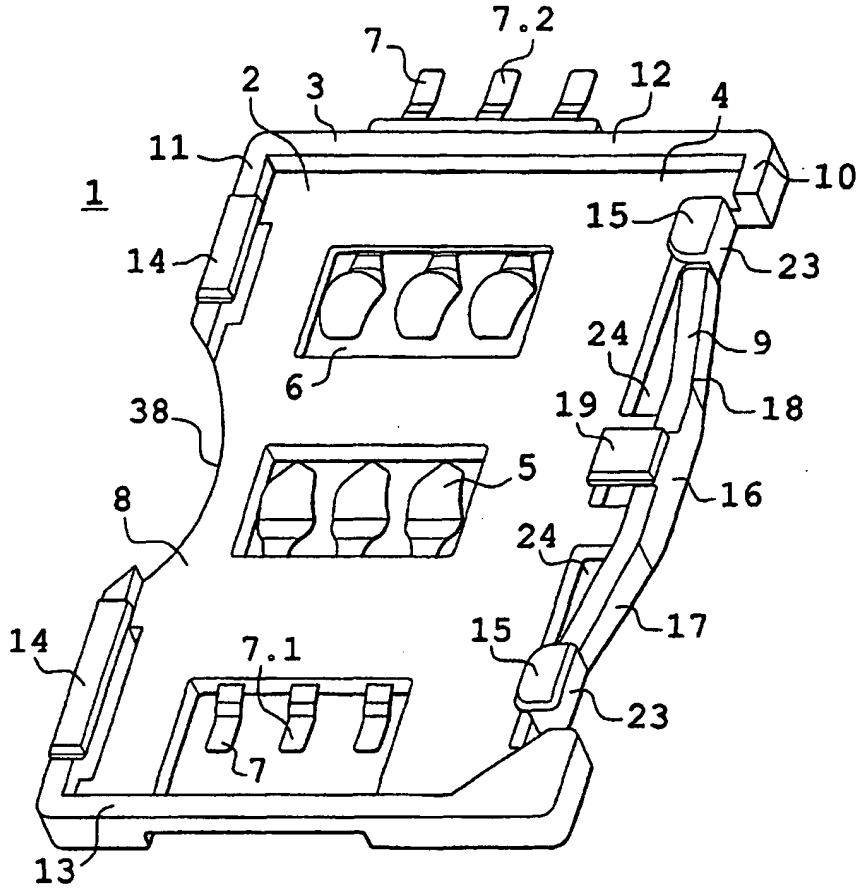
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Fig. 1

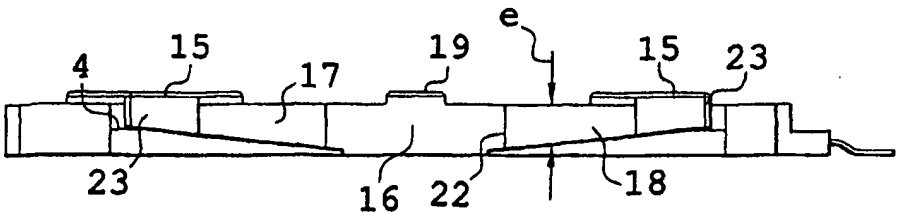
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Fig. 2

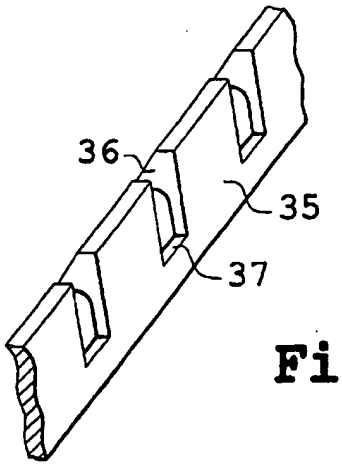

Fig. 4

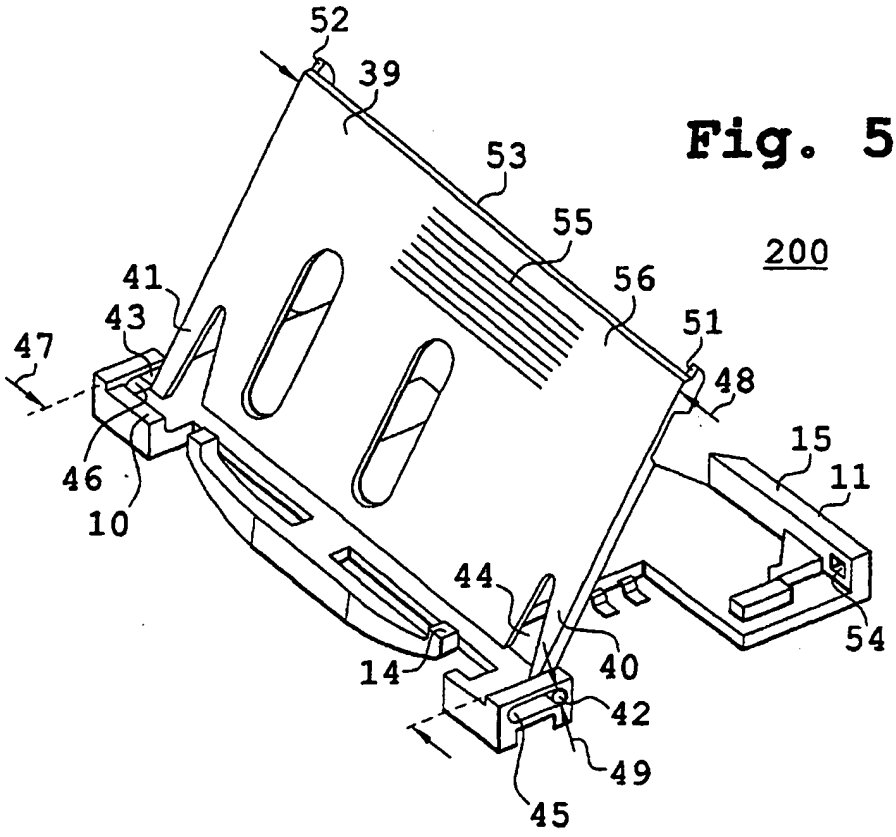
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Fig. 5

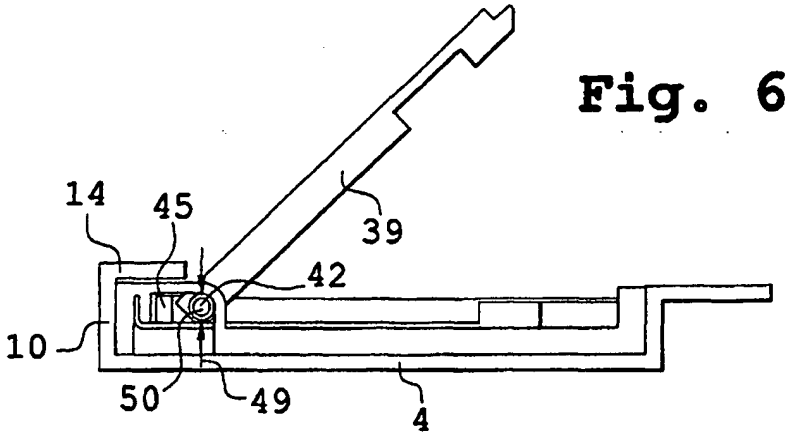
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Fig. 6